

Look-alike, sound-alike drugs in India

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The Indian pharmaceutical market is swamped with many branded and generic drugs which look-alike and sound-alike. These are a nightmare for healthcare professionals who deal with them. These drugs overlap in strength, dosage, indications, and storage conditions and packaging as well. The risks due to look-alike, sound-alike drug names result when a pharmacist or healthcare professional accidentally gives the wrong drug or patients select the wrong drugs themselves due to similarity in the name or packaging of the drug. The present study was aimed at listing out the recent drugs which look-alike and sound-alike in the Indian pharmaceutical market and also highlight various regulatory guidelines which are available in selected countries.

Accountability of patient safety should be given prime importance in the healthcare sector. Drugs are used to treat patients who suffer from diseases. While treating, prescribing and dispensing drugs to patients, healthcare professionals need to be careful to avoid medication errors. Such medication errors are usually due to incomplete prescribing information, poor communication skills, poor listening, or lack of knowledge about the drugs. Some patients take multiple drugs prescribed by different healthcare providers. In such cases it becomes more difficult to verify the cause of medication error¹. Another major contributing factor to medication error is confusing drug names that look or sound alike. The Indian pharmaceutical sector is the fastest growing across global pharmaceutical market. Many of the branded and generic drugs available in the market have confusing names. These drugs are called as look-alike, sound-alike drugs which are similar looking and similar sounding. Look-alike, sound-alike drugs create nightmare for health care professionals when they deal with². The medication error due to these drugs is increasing because of their similarities in many of features like strength, dosage, indications, storage conditions and packaging too. The aim of the study was to classify these confusing drugs names and to focus on regulatory guidelines available in selected countries.

The needed information was collected through secondary sources. Recent issues of Drug Today (January–March 2015, vols I and II) and Current Index of Medical Specialities (CIMS, October 2014–January 2015) were referred for the study. These issues enlist various medical formulations available in the Indian pharmaceutical market. These formula-

tions are only for information purpose and not medical guidance. The confusing drug and brand names were analysed for the study. For the study of regulatory guidelines websites of various regulatory agencies were referred.

Tables 1 and 2 shows confusing generic drug names and brand names with their indications.

Usually pharmaceutical companies select brand names which are easy to remember. This selection is based on either indication, action, company name or ingredients of the drugs. As can be seen from Tables 1 and 2, more the similarity in the names, more are the confusion errors. It can also be noted that drug brand names or generic names resemble each other, though they are mentioned for other indications. Thus measures need to be taken to reduce confusion errors. Basically all healthcare professionals need to play a vital role to reduce medication errors. Prescribers should be made aware of such types of drugs which are available in the market. The latest information about similar drug names and brand names can be provided through drug safety updates. Further, a prescription should be clear and readable by nurses and pharmacists³. The pharmacists can also play an important role in reducing medication errors. Whenever there is confusion or prescription error due to look-like/sound-like drugs, the pharmacist should immediately refer back to the physician. When look-alike/sound-alike drugs are stored in the pharmacy, there should be different colour labels for easy identification. Drug manufacturers can also reduce confusion of these similar looking drugs by giving different brand names to them. Packaging can also be different with minimal error for such types of drugs. Above all, the regulatory agen-

cies must play a crucial role for the import, manufacture, distribution and sale of drugs. These agencies should have control over the brand names of new drugs. They should be more stringent while issuing licenses and should exercise more control when it comes to branding of formulations. The regulatory aspects of a few countries are discussed below.

(1) WHO: The World Health Organization's International non-proprietary names expert group works to develop international non-proprietary names for pharmaceutical medicinal substances for acceptance worldwide⁴. However the drug brand names are fixed by pharmaceutical companies, which differ from country to country.

(2) Canada: The Health Canada is the federal department responsible for helping Canadians to maintain and improve their health. The Health Canada has issued a revised draft on review of drug names for look-alike/sound-alike drugs attributes for the pharmaceutical industry. The policy objective of review of drug names for look-alike/sound-alike drugs is to provide market authorization holders more detailed direction on the process to be followed and information to be submitted to the Health Canada. The information is regarding the potential for a proposed name which is similar to another product, so that it can be authorized for use in Canada with the aim of reducing medication errors⁵.

(3) United States of America: The National Coordinating Council for Medication Errors Reporting and Prevention was formed by the United States Pharmacopeial Convention to actively promote the reporting, understanding, and prevention of medication errors through the coordinated efforts of its member

Table 1. Look-alike and sound-alike drugs – similar generic and brand names

Generic name	Brand name	Indications (class of drugs)
Aminophylline	Aminophylline, phyllocontin	Antiasthmatic and chronic obstructive pulmonary disease preparations
Amitriptyline	Amline	Antidepressants
Amoxicillin	Actimox, amoxil	Penicillins
Ampicillin	Ampilin, eskaycillin	Penicillins
Azithromycin	Elzithro, Loromycin	Macrolides
Erythromycin	Althrocin, Eltocin	Acne treatment preparations, macrolides
Atenolol	Tenolol, catenol	Anti-anginal drugs, beta-blockers
Timolol	Glucomol, nyolol	Antiglaucoma preparations
Beclometasone	Beclate, becoride	Topical corticosteroids, antiasthmatic and chronic obstructive pulmonary disease preparations, nasal decongestants, other nasal preparations
Betamethasone	Betnelan, betnesol	Eye corticosteroids, ear corticosteroids, antiasthmatic and chronic obstructive pulmonary disease preparations, Corticosteroid hormones
Bisacodyl	Bid lax-5	Laxatives, purgatives
Bisoprolol	Bisbeta, bisveda	Beta-blockers
Carbamazepine	Carbadac, mezapin	Anticonvulsants
Carbimazole	Thyrozole	Antithyroid agents
Clonazepam	Clonopam, ozepam	Anxiolytics, anticonvulsants
Lorazepam	L-Zepam	Anxiolytics, anticonvulsants
Clofazimine	Clofaz	Antileprotics
Clomipramine	Clomifril	Antidepressants
Carboplatin	Carboplan, carbotin	Cytotoxic chemotherapy
Cisplatin	Cisplan, cytoplatin	Cytotoxic chemotherapy
Cefotaxime	Cefotim, sifotaxim	Cephalosporins
Cefuroxime	Cefoprim, cefurin	Cephalosporins
Cimetidine	Cimetiget	Antacids, antireflux agents
Clonidine	Clodict	Antihypertensive drug
Daunorubicin	Daunotec	Cytotoxic chemotherapy
Doxorubicin	Doxobin	Cytotoxic chemotherapy
Digoxin	Digox	Cardiac drugs
Doxepin	Doxesom	Antidepressants drugs
Dopamine	Dopacard	Cardiac drugs
Dobutamine	Dobucard	Cardiac drugs
Ergotamine	Vasograin	Antimigraine preparations
Ethionamide	Ethide	Anti-TB agents, antileprotics
Folic acid	Foliday	Vitamins and minerals
Fusidic acid	Fucidin	Topical antibiotics
Gatifloxacin	Gatiquin DPS	Eye anti-infectives, antiseptics
Gemifloxacin	Gemibid	Quinolones
Gliclazide	Glazed	Antidiabetic agents
Glipizide	Dibizide	Antidiabetic agents
Ibuprofen	Brufen	Nonsteroidal anti-inflammatory drugs
Ketoprofen	Ketopatch	Nonsteroidal anti-inflammatory drugs
Rabeprazole	R.P. Zole, rabezil	Antacids, antireflux agents, antiulcerants
Ketoconazole	Ketofast	Topical antifungals
Methyldopa	Alphadopa	Other antihypertensive drugs
Levodopa	Levopa	Antiparkinsonian drugs
Mebendazole	Mebazole	Anthelmintics
Metronidazole	Metron	Preparations for vaginal conditions, topical antibiotics, antiamoebics
Nifedipine	Depin, nifedine	Anti-anginal drugs, calcium antagonists
Nimodipine	Modipin, Nimodip	Peripheral vasodilators, cerebral activators
Olanzapine	Olzap, lezapin-MD	Antipsychotics
Olapatadine	Olodin, opat	Ophthalmic decongestants, anesthetics, anti-inflammatories
Pheniramine	Pheniramine, retard	Antihistamines, antiallergics
Phenylephrine	Drosyn	Mydriatic drugs, anorectal preparations, cough and cold preparations
Quinidine	Natcardine	Cardiac drugs, antimalarials
Quinine sulphate	Sacquine	Antimalarials
Roxatidine	Rotane	Antacids, antireflux agents, antiulcerants
Rupatadine	Rupanex, rup-AL	Antihistamines, antiallergics
Spiramycin	Rovamycin Forte	Macrolides
Streptomycin	Streptomac	Aminoglycosides
Simvastatin	Simvotin	Dyslipidaemic agents
Somatostatin	Somatosan	Haemostatics
Tramadol	Trama, tramazac	Analgesics (opioid)
Trazodone	Traze	Anxiolytics, antidepressants
Vinblastine	Cytoblastin	Carcino-chemotherapeutic drugs
Vincristine	Cytocristin, B-kristina	Carcino-chemotherapeutic drugs

Table 2. Look-alike and sound-alike drugs – generic drug pairs

Generic name	Brand name	Indications (class of drugs)
Amoxicillin + cloxacillin	Alclox	Penicillins
Cloxacillin + ampicillin	Ampoxin	Penicillins
Fluconazole + tinidazole	Fluzon-T	Antifungals
Levodopa + carbidopa	Pardopa	Antiparkinsonian drugs
Tramadol + paracetamol	Tramol-DT	Analgesics

associations and agencies, and to focus on ways to enhance patient safety⁶. In USA, the pharmaceutical manufacturers get pre-approval for proposed names from various organizations like US Pharmacopeia (USP) and US Food and Drug Administration (USFDA)³.

(4) Australia: The proposed regulatory changes according to the Therapeutic Goods and Administration (TGA) Australia, state that companies or sponsors of new medicines will be required to submit evidence of risk assessment of the proposed labelling and packaging. Further, TGA is looking for methods to electronically screen proposed brand names against already existing brand names to identify potential look-alike and sound-alike names. Regarding branding of medicines, the same brand name cannot be applied to products that have different active ingredients or their combinations, unless the active ingredients are closely related and safety profile, efficacy and dosage regimen are similar⁷.

(5) Malaysia: The Pharmaceutical Services Division, Ministry of Health, Malaysia has issued guidance on handling of look-alike/sound-alike medications. The guidelines consist of strategies to avoid errors with look-alike and sound-alike medications. The strategies are related to procurement, storage, prescribing, dispensing, administration, monitoring, information, patient education and evaluation of such drugs⁸.

(6) Singapore: The Ministry of Health, Singapore has issued a guidance note on medication safety. Practice guidelines and tools mention about medication safety pointing towards medication errors. These guidelines and tools may help healthcare professionals to ensure that the medication use process is safe. The guidelines also mention about storage, repackaging, caution to be maintained while dealing with look-alike and sound-alike medicines. It also give post information to staff on medications with similar names⁹.

(7) The United Kingdom: The Medicines and Healthcare Products Regulatory Agency regulates medicines and medical devices in the UK. The agency plays leading role in protecting and improving public health. Through drug safety updates the agency gives information about particular care to be taken when prescribing or dispensing look-alike/sound-alike medicines. Recent examples of medication errors are listed in drug safety updates¹⁰.

(8) Japan: To find out similar names of drugs, an on-line searching system (Japanese Similar Names Searching System) was implemented in Japan in 2008. In addition, the Japan Council for Quality Healthcare has developed a system in order to avoid medication errors¹¹.

(9) India: The Pharmacovigilance Programme of India was launched to improve patient safety and welfare in the Indian population by monitoring drug safety and thereby reducing risk associated with the use of medicines¹². This programme mainly emphasizes on adverse drug events. However in order to ensure patient safety, preventive measures need to be taken to tackle medication errors due to confusing drug names in India¹³. Introduction of appropriate system to search similar brand or confusing drug names is the need of the hour.

The Indian pharmaceutical industry is growing at a fast pace and is considered to be the third largest in the world in terms of volume. It is also among the top in the manufacture of generic medicines. New brands of drugs may continue to come to the pharmaceutical market on a regular basis. The need of the hour is to create awareness regarding the look-alike/sound-alike drugs, and develop methods such that there is no confusion regarding new brand names and non-proprietary names. Awareness among healthcare professionals, nurses, pharmacists and patients can done through various channels, e.g. mobile technology. Patients must also be encouraged regard-

ing report errors and potentially hazardous conditions related to confusing drug or brand names. To find out similar names of drugs, an on-line searching system should be implemented by the government. Further manufacturers and regulatory agencies should play a significant role in framing regulatory guidelines related to active ingredients, safety profile, efficacy and dosage regimen for these drugs.

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Need for targeted education programme for preparedness and formulating adaptive strategies in the Indian Himalayan region

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The Indian Himalaya continues to face increasing anthropogenic stressors despite numerous conservation actions. Further, climate change has the potential to negatively affect this biodiversity rich region. To counteract the changing climatic variables, targeted education programmes could act as a strategy and assist in protecting the floral/faunal species requiring urgent intervention, and benefit communities and ecosystems at large.

With the accelerating anthropogenic stressors on ecosystems and changing climatic variations, including extreme events, the importance of developing innovative and more pragmatic approaches to deal with these threats is widely acknowledged¹. The need to responsibly inform the society about current status of the environmental challenges²⁻⁴ through a range of resources such as print and electronic media⁴, broadly grouped under targeted education programmes^{5,6}, is also felt by the governments and policy makers.

Targeted education programmes⁵ have the potential to act as a tool for awareness and adaptive capacity building, enhance the process of shaping human behaviour for a positive response^{7,8} and empower people to behave more responsibly⁶. Awareness on climate sensitivity of an endangered species could help construct a positive association with that species⁹ and ultimately benefit the species and the overall protection and conservation of ecosystems¹⁰. For instance, local communities resolving to abstain from hunting tragopan (*Tragopan blythii*) in Khonoma Tragopan Sanctuary, Nagaland, and the protection of riverine biodiversity by the villagers of Kanalsi, Haryana¹¹ have helped in the conservation of these species. These community-based approaches set a good example of what is achievable with persuasive seriousness. More importantly, knowledge of

local stakeholders about species and their habitats could be helpful in formulating appropriate area-specific management strategies and in mitigating negative human-wildlife interactions¹.

There is also recognition of targeted educational programmes and their importance^{12,13} among a number of reputed organizations in India such as the Ganges River Dolphin Conservation; the International Snow Leopard Trust; WWF-India; the Wildlife Institute of India; Centre for Environment Education; C.P.R. Environmental Education Centre and the Nature Conservation Foundation, who have successfully conducted community awareness programmes.

Despite these potential benefits to the society, educating citizens outside the scientific community in ways that can assist them in becoming well-informed citizens¹⁴ is perhaps a big challenge. There is a limited understanding of a measurable impact of education among citizens on species conservation¹⁵ due to the lack of environmentally conscious behaviour¹⁶, despite having a good understanding of a particular species. Additionally, the implementation of effective educational programmes is sometimes negatively influenced by group size and demography of target audience^{17,18}.

It is not surprising that there is often an inadequacy in the design of programmes oriented for spreading conser-

vation education among the local communities, especially in remote parts of India such as the Himalaya. Most of the community-based initiatives lack clarity of objective, time frame and expected outcomes. Community targeted initiatives through workshops of short duration from one to a few days of field training invariably leave limited impact on local communities. As most programmes are project based with limited funding and duration, there is scarcity of long-term monitoring of implemented initiatives posing serious sustainability issues.

There are numerous strategies which could be utilized to overcome the challenges associated with targeted educational programmes. To begin with, such programmes should be addressed in the national curriculum at the school level, where more focused information should be provided to students regarding ecosystem and its services. The current environmental science course across India needs to be revised and up-scaled to nurture interest among graduates. This is especially vital due to the increasing anthropogenic threats faced by key biodiversity hotspots of India, including the Indian Himalayan region.

There is a growing pressure in the Indian Himalayan region due to increasing population and rapid urbanization, unsustainable exploitation of natural